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ABSTRACT

Data pertaining to Puerto Rican and Mexican American prospective engineering students, obtained from a 1978 survey conducted by the Minority Engineering Education Effort, are analyzed. Of the total population of 2,423 respondents, 426 were Mexican American and 122 were Puerto Rican. The study population was identified as interested in attending a four-year college and undertaking a quantitative curriculum; those surveyed were among the top two-thirds of scorers taking college entrance examinations. Twenty-six percent of the Puerto Rican respondents lived in Puerto Rico, while 39 percent lived in New York. Seventy-two percent of the Mexican American respondents lived in California and Texas. The majority of the respondents were in the last 2 years of high school, while about 20 percent were in their freshman year of college. Approximately 37 percent of the parents of the Hispanic respondents had less than a high school degree. The median income for the Mexican American households was $14,350, which was $1,750 higher than the median income for Puerto Rican respondents. Fifty percent of the Mexican American students' fathers were employed in engineering or architecture, compared to 41 percent for Puerto Ricans. Approximately 10 percent of the Mexican American students' mothers were employed in engineering or architecture, compared to 11 percent for Puerto Ricans. Information is also presented on siblings, Scholastic Aptitude Test scores, high school performance, career choice, parental and counselor influence, degree sought, and role models. Nearly 74 percent of the respondents were acquainted with minority engineers or scientists, and the majority of the students expected to obtain a master's degree in engineering. (SW)

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MEXICAN AMERICAN AND PUERTO RICAN PROSPECTIVE ENGINEERING STUDENTS

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May 10, 1982

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ABSTRACT

The purpose of the following report is to describe and present data on prospective Puerto Rican and Mexican American engineering students. Data was assembled in the summer of 1978 from 2,423 predominantly eleventh grade students who had not yet entered an engineering program but who planned to pursue a technical career. Four hundred twenty-six (426) Mexican Americans and 122 Puerto Ricans responded to the survey. The survey was conducted by NACME. Analysis of Mexican Americans and Puerto Rican responses was done under a subcontract to the Latino Institute Research Division.

Findings suggest that Hispanic engineering students who entered engineering schools in the late 1970s, many the beneficiaries of special activities designed to encourage better prepared minorities, are better prepared academically than the majority of Hispanic students. Also, Hispanic engineering students come from middle to high income families and have parents as engineering role models. These students predominantly have parents who "strongly" influenced their career choices. On the whole, these students are a unique subgroup among Hispanic and Puerto Rican entering undergraduates.

MEXICAN AMERICAN AND PUERTO RICAN PROSPECTIVE ENGINEERING STUDENTS

Introduction

Until 1784, when the Ecole Polytechnique was established in Paris, engineering was looked upon more as a trade than a profession. At that time, mechanical skills were passed down from master to apprentice. Thirty years later, the first engineering school in the United States, Rensselaer Polytechnic Institute, was founded. Between 1845 and 1850, Union College, the Lawrence Scientific School at Harvard, and the Sheffield Scientific School at Yale were founded. In 1865, the Massachusetts Institute of Technology was established. Today, nearly 300 colleges and universities offer engineering degrees to some 63,000 graduates a year. However, when we examine this figure for ethnic distribution, we find that less than 2% of all enrolled engineering students are Hispanic.

Of the nearly 63,000 graduates who received baccalaureate degrees in engineering in 1981, Black, Hispanic, Asian American and Native American students together accounted for only 8.3% of the graduates; Hispanics accounted for only 1.7% of the total. In order to achieve parity, as measured on the basis of the 1980 census of the college age population, Hispanics would have to reach 7.6%. At the master's level, all minorities accounted for 8% of the total; at the doctoral level, the corresponding percentage was 6.6%. For Hispanics, of the total enrolled in graduate school, 1.5% obtained M.S. degrees and 0.7% obtained Ph.D. degrees in engineering (Minorities in Engineering, 1982; Syverson, 1981).

While no official estimate of the number of experienced Hispanic engineers in the United States exists, unpublished data from the National Science Foundation (based on a response to a 1978 survey) indicate that 1.4% of all engineers in the United States are Hispanic. However, because of the very high non-response rate to the survey, this estimate should be used with caution. An examination of new entrants'

data suggests that in 1981 Hispanics made up 1.5% of the recently graduated engineers. One source estimates that Hispanic engineers in the United States number about 21,000 (Minorities in Engineering, 1982). In 1981, Hispanic students made up nearly 2.5% of the total engineering enrollments in schools throughout the United States. Since 1975, Hispanic enrollment in engineering schools has increased 120%. Electrical, mechanical, civil and chemical engineering are the main areas of concentration for Hispanic students, with nearly one-third majoring in electrical engineering.

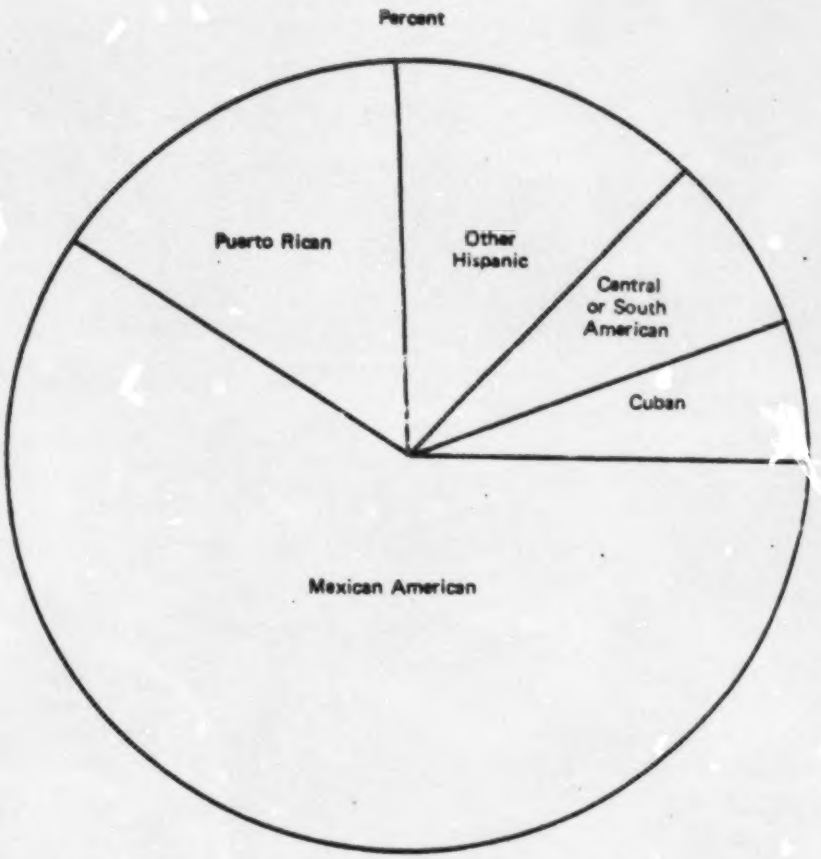
Hispanic college students, as well as all minorities, are unique when compared to traditional college students. Most come from low-income families and because of past discrimination practices, are not as well prepared academically. Most Hispanic students score lower on nationally normed tests, such as the Scholastic Aptitude Test (SAT), and earn extremely low grade averages during their first year of college. Nonetheless, large numbers of them do succeed in completing the average college curriculum and go on to complete their degrees (Betances, 1974; Brown, et al., 1980; Noboa, 1982). This report will examine the status, expectations and background characteristics of prospective Mexican American and Puerto Rican engineering students.

There is little documentation concerning Hispanic students in higher education (Noboa, 1982). The little that exists is a body of statistical data. However, there has been minimal analysis of this data.

More than 15 million people of Hispanic origin presently live in the continental United States. This figure can be divided into subgroups on the basis of national origin or descent (see Figure 1). The largest subgroup is, of course, composed of Mexican Americans, who number 7 million. Puerto Ricans number 1.8 million (not including the 3.2 million who live on the Island); Central or South Americans, 0.9 million; Cubans, 0.7 million; and "other Spanish," 1.5 million. Occasionally, throughout this report, reference will be made to residents from Puerto Rico as contrasted with Puerto Ricans who live in the continental United States. Unless Island residents are specified, the category "Puerto Ricans" refers to both continental and Island respondents. In addition, the rubric "Hispanic" will be used when referring to both Mexican Americans and Puerto Ricans.

FIGURE 1

Distribution of Hispanic Population on the Continental United States, by Subgroup



Methodology

In the fall of 1981, the Latino Institute's Research Division began a special effort with the National Action Council for Minorities in Engineering, Inc. (NACME). The purpose of this activity was to analyze data pertaining to Hispanic engineering students which had been compiled in 1978 by the Minority Engineering Education Effort (ME^3).[1]

During the summer of 1978, a survey was conducted of 2,423 students, between the ninth grade and the sophomore year of college, who were planning to enroll in engineering schools throughout the United States the following fall. The focus of the study was to delineate those mechanisms in pre-college and college activities which ultimately enhance minority students' success in engineering. It should be noted that these students had been identified, originall, by either The College Board or the American College Testing program, according to the followinf criteria designed to produce students with high potential for engineering:

1) intending to attend a four-year college;
2) interested in a quantitative undergraduate curriculum
3) among the top two-thirds of scorers taking college entrance examinations.

Thus, they are not necessarily representative of Hispanic youth and/or college students. As the efforts of NACME and organizations of similar goals have expanded since 1973, snd the supply of best-prepared youth exhausted, increasing attention has turned to the larger pool of minority youth.

The pre-admission questionnaire (PAQ) was designed to provide background information on students prior to their enrollment in college. This questionnaire yielded information on: (1) demographics, (2) pre-college educational experiences, (3) educational and professional goals, (4) career choices, (5) perception about the demands of college, and (6) attitudes and values about careers, education and goals in life. Decisions concerning the development of pre-admission questionnaire items were

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1 NACME, Inc. was created by a consolidation of ME^3 and the National Fund for Minority Engineering Students in September 1981.

based on their utility to: describe the cohort; establish baseline data on phenomena likely to change as a result of the student's experiences in engineering education, and explain differential outcomes experienced by students (Morning, Mullins & Penick, 1980).

Seven thousand four hundred and sixty-four (7,464) questionnaires were mailed to minority students. Sampling of the cohort indicated that 67% were Black, 17% were Mexican American, 14% were Puerto Rican and 2.0% were Native American. No special steps were taken to increase students' response rate. ME^3 however, offered a wide array of student services. Among these services were student employment, regular mailings of information and assistance with special needs. It was assumed that students would complete the PAQ in order to ensure continuation of services. These efforts resulted in a 43.6% response rate. While this response rate is usually considered an acceptable sample rate of return, many of the returns were not analyzed since they were received beyond the cut-off time mandated by limitations on available staff time.

The questionnaire mailing yielded 2,423 respondents. Seventy-three percent of the respondents were Black, 19% Mexican American, 5.5% Puerto Rican and 2.5% Native American. An overview of the total respondent population indicated the following:

1) 70.8% males, 29.2% females;

2) 75% members of two-parent families;

3) mean family income of approximately $18,000;

4) 99.9% indicated a need for financial assistance in order to attend college;

5) mothers and fathers had a high school education or less in approximately half of the cases;

6) In the majority of cases, both parents worked throughout the student's life.

In nearly all cases, the questionnaire mailing sample approximated that of the cohort. One noticeable exception to this was with the response rate among Puerto Ricans. One reason for such a low return rate among Puerto Ricans may be due to the high mobility of the Puerto Rican population.

Data on Puerto Ricans must be treated with caution. Among the 122 respondents to the questionnaire, 32 listed addresses in Puerto Rico. Given that nearly 30% of the sample lived in Puerto Rico, the sample for Puerto Rican respondents had a skew favorable to Puerto Ricans living on the Island.

In the fall of 1981, NACME approached the Research Division of the Latino Institute to undertake an analysis of this data obtained by NACME exclusively focusing on Mexican American and Puerto Rican respondents. The following is a summary of our findings.

General Findings

Distribution. Four hundred and twenty-six (426) Mexican Americans and one hundred and twenty-two (122) Puerto Ricans responded to the survey. These figures yielded a relative percentage of 77% Mexican Americans in comparison to 23% Puerto Ricans. According to 1970 census data, every state has some Hispanic residents, but 75% of all Hispanics are clustered in five states: California, Florida, New Mexico, New York and Texas. Hispanics account for 36% of the population of New Mexico, and 21% of the population of Texas. Among Puerto Ricans who responded to the survey, 26.2% were presently living in Puerto Rico, 39.3% lived in New York (principally New York City), and 13% lived in the Northeast (excluding New York). The remaining 21.5% were divided among eleven states: Virginia, South Carolina, Georgia, Florida (5.6%), Tennessee, Kentucky, Ohio, Indiana, Illinois, Colorado and California (2.4%). Mexican American respondents lived principally in California (39%), Texas (33.8%), Arizona (5%), Indiana (4%), Colorado (3.3%), New Mexico (3%) and Illinois (2.8%). This accounted for 91% of the total of Mexican American Respondents.

Sex and Age. Nearly 80% of the Hispanic respondents were male; slightly more than 20% of those interviewed were female. The majority of survey respondents were born in 1960 (73.5% Mexican American, 82% Puerto Rican) making them 18 years of age at the time of the survey. However, Mexican American respondents appeared to be slightly older than Puerto Rican respondents, 21.2% were nineteen or twenty years of age when the survey was administered compared to only 8.1% of the Puerto Rican respondents.

Parent's Education. Table 1 provides information on the educational level of the respondents' parents. While approximately 37% of the parents of all Hispanic students surveyed had not finished high school, 26% had completed a high school degree, and 31.6% had attended college or completed a college degree. In fact, 6.6% of both Mexican American and Puerto Rican respondents answered that their parents had a post graduate degree. According to survey data, there was little significant difference between parents.

Table 1

Parents' Education as Reported by Respondent

Level of Education	Mexican Americans[a]	Puerto Ricans[b]
Less than High School	36.1%	37.5%
High School graduates	25.9%	26.7%
Business/vocational school	4.9%	2.8%
Some College	12.8%	12.2%
Community college graduate	7.8%	3.5%
Four year college graduate	7.2%	9.3%
Advanced degree	5.3%	8.0%
Total	100.0%	100.0%

a_n = 152 Fathers; 153 Mothers

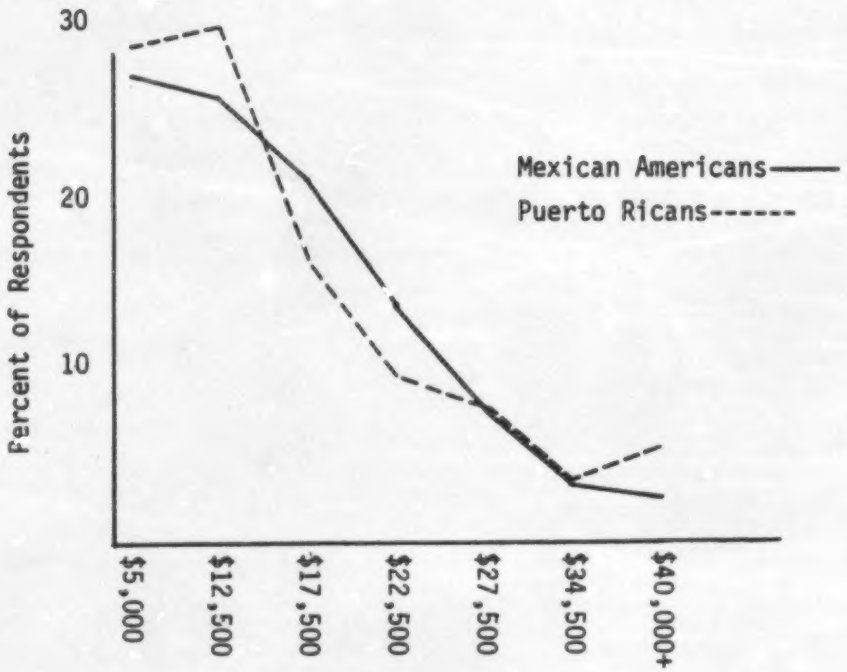
b_n = 37 Fathers; 38 Mothers

Employment and Income. Parent educational levels become significant when compared to household income. Figure 2 presents a comparison of household income for Puerto Ricans and Mexican Americans. According to survey data, the median income for a Mexican American household was $14,350. This was $1,750 higher than the median income for Puerto Rican respondents. Nearly 35% of the Mexican Americans and slightly more than 28% of the Puerto Rican respondents were from families in the $15,000-25,000 income bracket. According to 1980 U.S. census figures, during the same period, the median income for all Hispanics living in the continental United States was $14,771. Thus, it is apparent that those students interested in engineering as a career tended to come from considerably higher income families.

The median income for all families depends, in part, on how many are headed by men, and how many are headed by women. Eighty-five percent (85%) of the respondents answered that they had lived with both parents. Fifteen percent (15%) of the respondents, however, had lived exclusively with their mother.

FIGURE 2

Mexican American and Puerto Rican Average Household Income
(in percent)



In examining the employment of fathers, it was found that among Mexican Americans, half of those surveyed listed that their father's occupation was in engineering or architecture, compared to 41% for Puerto Ricans. One quarter (25%) of the respondents listed their fathers as being self-employed and 24% Mexican Americans, and one-third (33%) of the Puerto Rican respondents listed their fathers' occupations as being in a health-related field.

Although the second major earner in the family is usually the wife, sometimes a child, parent, or another relative is the second worker. Among both Puerto Rican and Mexican American respondents, 40% of their mothers were employed in the labor force before the respondent had entered elementary school, and 23% of their mothers had worked while the respondent was in elementary school.

Respondents listed a large number of the mothers as having professional careers (see Table 2). Seventy-five percent (75%) of the mothers of Mexican American respondents and eighty percent (80%) of the Puerto Rican respondents' mothers were in professional careers, principally health (11.7%), engineering and architecture (10.7%), accounting and computer sciences (9.6%) and self-employed (7.2%). Nonetheless, 20% of the respondents' mothers and 0.9% of the Puerto Rican respondents' mothers were employed in mechanical/technical and labor positions, respectively.

Table 2

Mother's Occupation as Reported by Respondents

Occupation	Mexican Americans n = 364	%	Puerto Ricans n = 99	%
Engineering/Architecture	38	10.4	11	11.1
Self employed	23	6.3	8	8.1
Accounting/Computer Science	33	9.1	10	10.1
Management/Admin./Supervision	5	1.4	2	2.0
Mechanic/Technician	133	36.5	29	29.3
Labor	86	23.6	18	18.2
Public/Civil Service	3	0.8	1	1.0
Physician/Dentist	9	2.5	6	6.1
Health Related Careers	34	9.3	14	14.1

When comparing the mothers' employment history among both subgroups, there is a large discrepancy among respondents while they were in high school. Among Puerto Ricans, nearly 60% of the respondents' mothers did not work while the respondent was in high school as compared to 35% among Mexican Americans. During the period before the respondent entered elementary school to the present, Mexican American working mothers grew from 30% to 65%, while the sample of Puerto Rican working mothers remained about the same (30%). It would be difficult to speculate on the reasons for the large number of non-working Puerto Rican mothers from the data in this study; however, it is interesting to note that fewer Puerto Rican mothers worked while the respondent was in school than did Mexican American mothers.

Siblings. The average number of siblings reported for Puerto Ricans and Mexican Americans considering engineering was 2.3. Given that the majority of the respondents came from households with both parents present, the household size is nearly equal to that of the average size for all Hispanic families in the United States. According to census data, the average number of siblings for a Mexican American household was 2.6 and about 2 siblings per Puerto Rican family.

Respondents were asked to provide information on the educational attainment of their oldest and next oldest sibling. Eighty-two percent of Mexican American respondents and 68% of Puerto Rican respondents had more than one older sibling. Data from the survey indicates that the next oldest sibling was more likely to have a higher level of educational attainment than the oldest. In addition, Mexican American siblings were more likely to have completed high school than were Puerto Rican siblings. Among Mexican American siblings, 24% had as already completed a college degree program; among Puerto Ricans, however, only 18% had completed college.

Mexican American respondents' siblings (11.7%) were also more likely to have an advanced degree than Puerto Ricans (6.5%). This is important since there have been several studies that show that siblings educational attainment is likely to influence younger sibling's educational attainment (Noboa, 1982).

Schooling Characteristics. Fifty-one percent (51%) of all Mexican American respondents to the PAQ were in the eleventh grade of high school, 28% were in twelfth

grade, and 20% were in their freshman year of college. Among Puerto Ricans, 36% were in grade 11 , 41% in grade 12, and 20% in their first year of college.

Sixteen percent (16%) of Puerto Rican respondents attended schools in which the ethnic composition was between ninty-five and one hundred percent minority. This low percentage is due in part to the fact that 26% of the Puerto Rican respondents lived on the Island. When factoring out those respondents living in Puerto Rico, a more integrated picture is presented: 65% of those Puerto Rican respondents living in the continental United States attended schools which were predominantly or exclusively majority. This was much higher than figures obtained for Mexican Americans (44.2%). Mexican American respondents were less likely to have attended schools that were predominantly or exclusively (95-100%) minority, 31% in comparison to 65% for Puerto Rican respondents living in the continental United States.

SAT Scores. The Scholastic Aptitude Test (SAT) is a multiple-choice test that attempts to measure general verbal and mathematical abilities, SAT-verbal and SAT-mathematical scaled scores range from 200 to 800. Both scales were established in the 1940s and were arbitrarily defined to have a mean of 50 and a standard deviation of 100 (Admissions Testing Program of the College Board, 1980).

A total of 84 Puerto Rican and 174 Mexican American respondents reported having taken the SAT. Scaled score distributions for the verbal and mathematical tests, as reported by respondents, are listed in Table 3. Means are presented at the bottom of the Table. For survey respondents, the mean scaled verbal and mathematical scores were 458 and 544 for Mexican Americans and 467 and 532 for Puerto Ricans, respectively, As would be expected for prospective engineering students, mathematical scores average 83 points above the mean of 455 (as measured by March 1980 SAT scores). Closer examination reveals that while respondents, on the average, qualified for admission to minority programs in engineering at selective institutions, their scores were nevertheless lower than their majority counterparts at these schools (Table 4).

TABLE 3

Percentage Distribution for SAT
Administered in March 1980 and for Survey Respondents

Scaled Score	Verbal Section			Mathematics Section		
	1980[a] SAT	Mexican Americans[b]	Puerto Ricans[c]	1980[a] SAT	Mexican Americans[b]	Puerto Ricans[c]
720-800	0.4	0.8	0	1.3	3.4	3.8
610-710	4.7	6.6	6.3	9.1	22.4	16.9
540-600	9.7	16.3	15.8	12.7	32.2	32.3
400-530	40.8	56.0	57.4	39.5	39.7	43.2
200-390	44.4	20.3	20.5	37.4	2.3	3.8
	100.0	100.0	100.0	100.0	100.0	100.0
Means	418	458	467	455	544	532

[a] Admissions Testing Program of the College Board, 1980. n = 179,162

[b] n = 84 Puerto Ricans;

[c] n = 174 Mexican Americans

High School Performance. According to data provided by the National Center for Educational Statistics (Brown, et al., 1980), Hispanic and Anglo high school seniors reported spending almost equal amounts of time on their homework (less than five hours per week). Yet, Hispanic students tended to receive lower grades than their Anglo counterparts. Indeed, only 35% of Hispanics reported grades of "mostly B" or better, compared to 52% of the Anglo students.

Survey respondents were asked to provide information on grades received for these select high school subjects generally required for entry into engineering programs (Table 5). These subjects included Algebra I and II, Geometry, Trigonometry, Physics and Chemistry. Approximately 80% of the respondents reported that they generally received A's or B's. As shown on Table 5, Mexican Americans tended to score higher.

Among survey respondents, 6.[illegible]% reported working hard to get their grades. Sixty-six percent (66%) of the Mexican American respondents and 61% of the Puerto Rican respondents rated their high school performance rate as "strong" or "very strong." When this was compared with how respondents view the quality of their education, 70% of Mexican Americans surveyed and 58% of Puerto Ricans reported having received an "adequate" or "good" education. Twenty percent (20%) of the Mexican Americans reported that the quality of their education was excellent. Thirty percent (30%) of Puerto Ricans agreed that their high school education was excellent.

Among Mexican Americans (34%) and Puerto Rican respondents (38%) who rated their high school performance record as weak or average, 22% said that, on occasions they had felt ill as a result of a desire to do well in school. Among those who rated their high school performance as strong or very strong, 23% of the Mexican American respondents and 26% of the Puerto Rican respondents, said that they had felt ill as a result of a desire to do well in school.

A high percentage of the respondents (81%) had received academic honors during their high school years.

Delayed Education: Respondents' progress through school can be measured by whether they are enrolled at or below the expected grade level for their age. Being enrolled

Table 4

Scores for Minority Students and Score Requirements for Admission to Selective Schools with Minority Programs in Engineering

School	Combined SAT Score Required for Admission to the Minority Program[a]	Average Combined SAT Score for Males Majoring in English[b]
Berkeley	900	1163 (all curricula)
Carnegie-Mellon	850	1300
Case-Western	1000	1262
Drexel	900	1130
U. Pennsylvania	900	1240

[a] Minorities in Engineering, 1974.

[b] Cass and Birbaum, 1979.

Table 5

Percent Distribution of Grades Reported on Select Subjects

Subject matter	Grade							
	A		B		C		D	
	Mex.	PR	Mex	PR	Mex.	PR	Mex.	PR
Algebra I	58.8	41.7	29.5	38.1	9.4	15.3	2.3	4.8
Algebra II	49.3	39.2	35.4	43.0	12.8	11.4	2.5	6.3
Geometry	51.3	36.0	35.0	38.4	10.2	18.6	3.5	7.0
Trigonometry	51.4	41.0	34.4	39.3	11.8	9.8	2.4	9.8
Physics	47.0	30.0	35.6	48.0	12.8	14.0	4.7	8.0
Chemistry	45.4	38.8	37.8	43.3	12.6	13.4	4.2	4.5
Mean	50.5	37.8	34.6	41.7	11.6	13.8	3.3	6.7

below grade level can result in many problems which may lead the student to eventually drop out as soon as he or she passes the age of compulsory attendance (16 years of age in most states). Among Mexican American respondents surveyed, 18% of the respondents were one year or more below the grade level for their age. Among Puerto Ricans, this figure becomes more dramatic: of all Puerto Rican respondents enrolled in 11th grade, nearly 91% were 18 years of age or older.

Engineering Chosen as a Career. Among Mexican Americans, 45% became interested in engineering as a career while they were in 9th or 10th grade; among Puerto Ricans nearly 60% became interested during these two grades. Mexican Americans (23.3%) became interested while in their present grade (i.e., 19.5% of the respondents became interested in studying engineering as a career while presently enrolled in 11th grade). Puerto Ricans appear to have become interested in engineering at an earlier age than Mexican Americans. This may be due in part to the fact that they had more exposure and contact with scientists and engineers. Eighty-five percent (85%) of Puerto Rican respondents were acquainted with engineers and scientists. In contrast, only 65% of Mexican Americans also reported knowing minority engineers.

Parental and Counselor Encouragement. Parental encouragement has been shown to be another major factor influencing students' decision to continue their college education. Both Puerto Rican and Mexican American respondents (56%) said they were "very much encouraged" by their parents to pursue a college education. It must be pointed out that approximately 45% of the respondents had parents with an engineering degree. However, among those responding that their parents had greatly encouraged them to pursue higher education, about half of the respondents said that they had received little or no encouragement to pursue a career in a technical area. The majority (70%) of the respondents' parents were "satisfied" or very "satisfied" with their child's grades. Only 3.6% of Mexican American parents and 2.3% of Puerto Rican parents "didn't care" about grades. Thus, it can be assumed that the majority of parents actively encouraged their children to do well in school and pursue a career.

While more than half of the respondents answered that they had been encouraged to pursue a college education by their high school teacher and/or counselor, this should not necessarily be interpreted to mean that counselors had direct impact upon the respondents. Student respondents, as has been noted, were high achievers, had parents with middle to high income, were acquainted with engineers and had decided at an

early age to pursue an engineering career. These factors may have had a greater influence in their career choice than the role of counselors. Furthermore, counseling services were not available for 6.8% of the Mexican American respondents and 18% of Puerto Rican respondents. Nearly 16% of both groups of respondents had not consulted with a guidance counselor at all. Among those respondents who had sought advice, 25.6% of the Mexican Americans and 33% of the Puerto Ricans found such services to be very helpful, especially to obtain information on schools or colleges which suited his or her abilities and interests, school qualifications, school costs, and how to obtain financial aid. Thirteen percent (13%) of the respondents found counseling services not to be helpful and a small percentage (5%) found them to be a hindrance.

Career Interest. Nearly 75% of all respondents chose engineering as their career choice. Other career choices included: Architecture (13.5% Mexican American; 6.3% Puerto Rican), Computer Sciences (5.6% Mexican American; 6% Puerto Rican), Biophysics and Biochemistry (3% Mexican American; 6.3% Puerto Rican), Physical Sciences (5.3% Mexican American; 3% Puerto Rican); and Mathematics (4.1% Mexican American; 3% Puerto Rican).

Degree Sought. Fifty-six percent (56%) of all Mexican Americans surveyed expected to obtain a B.S. in engineering; 19.7% expected to complete a B.A.; and 14.8% expected to pursue a technical college degree in a field other than engineering. A high percentage, 78.2%, of Mexican American respondents expected to pursue a M.S. in engineering and a small number (13.5%) planned to continue onto a Ph.D. This pattern varied somewhat for Puerto Ricans. Forty-six percent (46%) expected to pursue a B.S. in engineering and 4.8% a B.A. in another subject. Nearly 50% of the Puerto Rican respondents planned to work toward an M.S. in engineering and 17% an M.S. in another technical field. More than half (29.2%) of the Puerto Rican group expected to pursue a Ph.D. degree in engineering.

Success in Completing Engineering Degree. Forty-eight percent (48%) of the Mexican American respondents said that they anticipated having a seventy percent (70%) chance or better of completing their B.S. in engineering. This was somewhat lower for Puerto Ricans (44%). In order to successfully complete their degree, 76% of the Hispanic respondents said that between 16 and 35 hours of study was necessary. Nonetheless, among those who said that between 16 and 30 hours per week was necessary, 25% said they studied less than 10 hours, 20% studied between 15 and 20 hours and only 15% studied between 20 and 25 hours a week while in high school.

Student respondents were provided four statements and asked to choose a response of agreement or disagreement for each one of these statements:

1) a. In the case of the well-prepared student there is rarely if ever such a thing as an unfair test.

   b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

2) a. Sometimes I can't understand how teachers arrive at the grades they give.

   b. There is a direct connection between how hard I study and the grades I get.

3) a. People who don't do well in life often work hard, but the breaks just don't come their way.

   b. Some people just don't use the breaks that come their way. If they don't do well, it's their own fault.

4) a. I have found out that what is going to happen will happen.

   b. Trusting fate has never turned out as well for me as making a decision to take a definite course of action.

Among survey respondents, 80% agreed that for "the well prepared student" there were very few unfair tests. Nearly 90% of the respondents agreed that there was a connection between how they studied and the grades they received. Eighty-five percent (8[illegible]%) of the respondents answered that they did not believe in fate as indicated by the results of the questionnaire. Some discrepancy to the above pattern was noted on the third statement. Thirty-eight percent (38%) of the Mexican Americans and 29% of the Puerto Rican respondents felt that "breaks" often played an important role in getting ahead.

Group cohesiveness refers to attraction of members to a group as a whole. One indicator of group cohesiveness is one's loyalty toward the group. Students surveyed were asked two questions dealing with group loyalty (see Table 6). As shown on Table 6, Puerto Ricans appeared to be less likely to conform to group norms and aspirations than were the Mexican American respondents. In terms of attitude toward schooling, it is often assumed that individualism often leads to a high rate of educational success (Zintz, 1963).

Table 6

Mexican American and Puerto Rican Rate of Response to Questions on Group Loyalty and Conformity

Survey Questions	Mexican Americans	Puerto Ricans
1) "It is more important to be loyal and conform to your own group than to try and cooperate with other groups."		
1. Strongly agree	1.9%	2.3%
2. Agree	3.7%	–
3. Agree somewhat	20.4%	9.3%
4. Disagree	34.0%	46.5%
5. Strongly disagree	40.0%	41.9%
TOTAL	100.0%	100.0%
2) "To be successful, a group's members must act and think alike."		
1. Strongly agree	7.3%	7.0%
2. Agree	11.6%	7.0%
3. Agree somewhat	22.6%	16.3%
4. Disagree	29.9%	32.6%
5. Strongly disagree	28.6%	37.1%
TOTAL	100.0%	100.0%

Summary

The purpose of this report is to describe and present data on prospective Puerto Rican and Mexican American engineering students. Data was assembled in the summer of 1978 from 2,423 students between the ninth grade and sophomore year of college who had not yet entered an engineering program but who planned to pursue engineering as a career. Four hundred twenty-six (426) Mexican Americans and one hundred twenty-two (122) Puerto Ricans responsed to the survey.

Findings were:

- Residence: Twenty-six percent of Puerto Rican respondents lived in Puerto Rico; 39% lived in New York. Seventy-two percent of the Mexican American respondents lived in California and Texas.
- Age: Mexican American respondents appeared to be slightly older yet, Puerto Rican respondents appeared to be one or more years younger.
- Parents' Education, Income and Employment: Approximately 37% of the parents of respondents had less than high school degree. Nonetheless, the mean household income was approximately $15,225. A large number of respondents (46%) indicated coming from families whose fathers' educational background was listed as in engineering and architecture.
- Role Model. Seventy percent of the respondents' siblings had more than a high school degree. Thus, a strong role model within the family appears to be important. Nearly seventy-four percent of the respondents were acquainted with minority engineers or scientists.
- Schooling Characteristics: 51% of Mexican American respondents were in grade 11, 28% in grade 12, and 20% in freshman year of college; Among Puerto Ricans, 36% were in 11th grade, 41% in 12th and 20% in their first year of college.
- SAT Scores: Hispanic respondents scored above the mean for all students on the SAT.
- High School Performance: The overall high school performance rate as measured by several indicators (grades, SAT, high school honors, etc.) was high for both groups thus guaranteeing some degree of success in college.
- Quality of High School Education: The majority of the Hispanic respondents (57%) rated their high school training as "good" or "excellent."
- Parental Attitudes: Parental attitudes appear to have been a strong motivating force. In the basis of the survey, parents had definite attitudes toward their childs grades. Only 2.8% of the parents "didn't care" about the

grades their children received. Eighty-four percent of the parents had encouraged their children to pursue a college education either "much" or "very much."

- Engineering as a Career: Respondents became interested in engineering while in high school. The majority were encouraged by parents or contact with professional engineers. Others were encouraged by their high school counselors. The majority of the respondents expected to obtain an M.S. in engineering.

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